

Remarks:

Claims 1, 3-5, and 7-11 are presented for the Examiner's review and consideration. Claim 1 has been amended. Claims 12-20 have been withdrawn. Applicants believe the claim amendment and the accompanying remarks, herein, serve to clarify the present invention and are independent of patentability. No new matter has been added.

Request for Information

The Examiner was interested to see an Encyclopedia Britannica article relating to old Egyptian recipes; attached is an article mentioning the Egyptians at line 3 and glue or gums at line 4.

35 USC S 103(a) Rejections

Claims 1, 3-5, and 7-11 were rejected by the Examiner under 35 USC § 103(a) as being unpatentable Lai, et al (Lai) in view of Ausman, et al. For reasons set forth below, Applicants respectfully submit that this rejection should be withdrawn.

With regard to Claim 1, Lai teaches solubilizing C₆₀ fullerene in water with the use of cholesteryl-pullulan, whereas the instant method employs polysaccharides or polypeptides. These polysaccharides or polypeptides are inherently hydrophilic, and thus, principally different from Lai's hydrophobic cholesteryl-pullulan. Lai also deals with encapsulating small hydrophobic molecules, including fullerene with "hydrophobilized polysaccharides" (page 64, col. 1, 3rd par.), while the instant method relates to untangling very long tubes (par. [0003], Fig. 4 of the present specification) by means of hydrophilic polymers. The dimensions of carbon tubes are by several orders greater (microns) than the size of C₆₀ fullerene (angstroms). Lai's pullulan (even before said hydrophobilization), consisting only of glucose units, radically differs from the preferred polymers of Applicants' method (either polypeptides or saccharides containing non-glucose units (claims 7 & 8).

Not only are the employed materials of Lai's disclosure different than Applicants', but the employed procedures are also different. Lai teaches admixing pyridine to the mixture since simple

mixing of the components does not lead to complexation (page 64, col. 1, 5th par.). Furthermore, admixing pyridine is not sufficient without stirring the mixture for 2 days (!) followed by dialyzing.

The sonication in Lai mentioned in the Office Action (page 4, line 8) is not used to solubilize fullerene as asserted. On the contrary, it is used to extract fullerene into toluene for the spectroscopic determination.

As correctly noticed by the Examiner, Ausman mentions that solution-phase handling would be exceptionally useful. Such handling is mentioned in paragraph [0010] of the instant application as one of the objects of the present invention. However, Ausman does not teach how to perform such handling without organic solvents, but the Applicants' invention provides this solution.

It is respectfully submitted that Lai and Ausman cannot be combined to provide the instant method. Ausman merely reviews the ability of organic solvents to disperse the carbon nanotubes, and Lai discloses the solubilization of C₆₀ fullerene by a 2-day mixing with hydrophobized pollulan and pyridine. A person skilled in the art would have been hardly inspired by any of the cited documents or their combinations to add carbon nanotubes simply to a water solution of a hydrophilic polymer, preferably polysaccharide or polypeptide, and sonicate the mixture. Many attempted to comply with the hydrophobic character of the carbon nanotubes by introducing organic solvents or surfactants, or at least by increasing hydrophobicity of the dispersing agents, but nobody tried the apparently futile procedure according to the invention of direct mixing hydrophilic polymer with the tubes and sonication. Ausman summarizes the state of the art in the last paragraph of the document cited by the Examiner:

“In summary, we have investigated the room-temperature solubility of SWCNTs in a variety of solvents, finding a class of non-hydrogen bonding Lewis bases that provide good solubility.”

An aqueous solution of hydrophilic polymer is not among the solvents recommended by Ausman in 2000, but it appears in the priority application of the current Applicant's invention.

In order to better distinguish Applicants' invention from the prior art, claim 1 has been amended to incorporate the feature of polymer hydrophilicity. Accordingly, amended claim 1 would not be obvious to one with ordinary skill in the art reading Lai in view of Ausman under 35 USC § 103(a). As Claims 3-5 and 7-11 depend from Claim 1, these dependent claims necessarily include all the elements of their base claim. Accordingly, Applicants respectfully submit that the dependent claims are allowable over the references for the same reasons.

Additionally, with regards to Claim 3, freeze drying is combined with the instant novel dispersing method to provide an easily dispersible nanotubes/polymer powder. Although comprising a known method (freeze drying), claim 3 provides a preferred embodiment of the new method of nanotubes dispersal according to claim 1.

With regards to Claim 7, the Examiner cites Connors in regard to the use of gum Arabic. Connor mentions gum Arabic among all existing polysaccharides (col. 3-5), and teaches that acrylamide together with said polysaccharide and with salts and tannin (see claim 1) are advantageous in comparison with polyacrylamides alone in regard to their flocculating potency (lines 15-19, col. 1). The flocculation, actually the opposite process to dispersion, is related too.

Applicants: Yerushalmi-Rozen et al.
Application No.: 10/667,204
Examiner: McCracken

Conclusion

In light of the foregoing remarks, this application is now in condition for allowance and early passage of this case to issue is respectfully requested. If any questions remain regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

No fee is believed due. However, please charge any required fee (or credit any overpayments of fees) to the Deposit Account of the undersigned, Account No. 500601 (Docket No. 7640-X03-011).

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Fleit', with a large, sweeping initial 'F' and a stylized 'R' at the end.

Martin Fleit, Reg. No. 16,900

By PAUL D. BIANCO Reg # 43,500

Customer Number: 27317

FLEIT KAIN GIBBONS GUTMAN BONGINI & BIANCO
21355 East Dixie Highway, Suite 115
Miami, Florida 33180
Tel: 305-830-2600; Fax: 305-830-2605
e-mail: LPearson@FocusOnIP.com